

Assessment of Agricultural Intervention on Ecosystem Services in the Central-South Zone of Chile

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Abstract : The growth of societies has increased the consumption of raw materials and food obtained from nature. This has influenced the services offered by ecosystems to humans, mainly supply and regulation services. One of the indicators used to evaluate these services is Net Primary Productivity (NPP), which is understood as the energy stored in the form of biomass by primary organisms through the process of photosynthesis and respiration. The variation of NPP by defined area produces changes in the properties of terrestrial and aquatic ecosystems, which alter factors such as biodiversity, nutrient cycling, carbon storage and water quality. The analysis of NPP to evaluate variations in ecosystem services includes harvested NPP (understood as provisioning services), which is the raw material from agricultural systems used by humans as a source of energy and food, and the remaining NPP (expressed as a regulating service) or the amount of biomass that remains in ecosystems after the harvesting process, which is mainly related to factors such as biodiversity. Given that agriculture is a fundamental pillar of Chile's integral development, the purpose of this study is to evaluate provisioning and regulating ecosystem services in the agricultural sector, specifically in cereal production, in the communes of the central-southern regions of Chile through a conceptual framework based on the quantification of the fraction of Human Appropriation of Net Primary Productivity (HANPP) and the fraction remaining in the ecosystems (NPP remaining). A total of 161 communes were analyzed in the regions of O'Higgins, Maule, Ñuble, Bio-Bío, La Araucanía and Los Lagos, which are characterized by having the largest areas planted with cereals. It was observed that the region of La Araucanía produces the greatest amount of dry matter, understood as provisioning service, where Victoria is the commune with the highest cereal production in the country. In addition, the maximum value of HANPP was in the O'Higgins region, highlighting the communes of Coltauco, Quinta de Tilcoco, Placilla and Rengo. On the other hand, the communes of Futrono, Pinto, Lago Ranco and Pemuco, whose cereal production was important during the study, had the highest values of remaining NPP as a regulating service. Finally, an inverse correlation was observed between the provisioning and regulating ecosystem services, i.e., the higher the cereal or dry matter production in a defined area, the lower the net primary production remaining in the ecosystems. Based on this study, future research will focus on the evaluation of ecosystem services associated with other crops, such as forestry plantations, whose activity is an important part of the country's productive sector.

Keywords : provisioning services, regulating services, net primary productivity, agriculture

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